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# THE NEED FOR WILDLIFE HABITAT DIVERSITY ON BLM - MANAGED FOREST LANDS IN WESTERN OREGON

Division of Resources
Oregon State Office
Bureau of Land Management

This is a proposal for the management of BLM's forest lands in western Oregon to assure adequate habitat diversity to meet wildlife requirements.

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# THE NEED FOR WILDLIFE HABITAT DIVERSITY ON BLM-MANAGED FOREST LANDS IN WESTERN OREGON

## I. Introduction

Current timber management practices on lands under the control of the Bureau of Land Management are rapidly converting the remaining stands of older forest seral stages of predominately Douglas-fir (Pseudotsuga menziesii) into an even-aged second growth with a planned rotation age of 50 to 80 years.

Loss of older seral stages and the projected short-term cutting cycle of young second growth and associated intensive management practices will have an adverse effect on many species of wildlife. Retention of well distributed stands of older seral stages exhibiting some decadency is required to benefit cavity dwellers, several species of raptors and other wildlife. An admixture of mature conifers is also a necessary part of most riparian zones in western Oregon. This structural and vegetal component is necessary to maintain the integrity of the riparian ecosystem. Currently, merchantable timber in many riparian zones is being harvested.

Unfortunately, in the case of old growth perpetuation, there are management conflicts between forest management and wildlife habitat requirements for those species of birds, mammals, reptiles and amphibians that require the large size, conditions of decadency, understory diversity, and multilayered canopies found in older forests. These stand characteristics are at the opposite end of the scale as envisioned by foresters under a mandate to produce a high volume of merchantable trees for structural materials and paper production. Projected timber supply shortages and spiraling housing costs are placing increased pressure on the harvest of both old growth and mid-age forests. The dependence of industry on the Bureau of Land Management as a source of raw materials has intensified these demands. Figure 1 illustrates current age classes of forest lands in western Oregon. Note that only significant acreages of very young and mature stands remain; substantial timber harvesting did not begin on BLM lands until the mid-1950s. Table 1 illustrates seral stage characteristics.

Intensive timber management calls for harvest long before a stand has reached the "old-growth" stage, and in most cases before it has reached the "mature" stage. These two stages, particularly old-growth, usually exhibit the greatest structural diversity. Old-growth stands may exist in a relatively stable condition for hundreds of years (Franklin et al. 1981). In short, as timber management is intensified, the early successional stages are accelerated and compressed while the later stages are truncated and deleted (Edgerton and Thomas 1978, Meslow and Wight 1975). Through time, intensive timber management will also eliminate large snags (dead, standing trees) and logs within managed forests of the future by not allowing for their replacement through the management of the mature and old-growth stages.

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As snags and logs decompose, successional vegetation grows up around them and offers changing habitats through time forming physical links from one forest stand to the next. Felling snags and removing logs are therefore practices that have direct consequences to habitat diversity (Franklin et al. 1981, Maser et al. 1979, Meslow and Wight 1975, Thomas et al. 1979). Other silvicultural practices alter important habitat components (food and cover) around logs, and single-purpose slash treatment removes the woody debris. These materials and nutrients are critical to the health and welfare of the forest as a whole (Sollins et al. 1980). It is thus apparent that silvicultural practices aimed solely at wood fiber production have increasing cumulative effects on wildlife habitat diversity within managed forest ecosystems.

A forest growing at its sustained yield capacity is characterized by a relatively equal distribution of age classes, ranging from zero to rotation age. The rotation age is based on the age of maximum timber growth which in western Oregon presently averages about 80 years. Under these conditions, the forest will be growing at its sustained yield capacity and annual cut and annual growth will be equal. This style of management does not contemplate retention of old growth forest lands. At the current rate of cutting, most old growth forests on BLM lands in Oregon will be harvested in the next 20 to 30 years, and, in some districts, within the next 10 years. In addition to regular forest stands, much of the old growth found in western Oregon lies in riparian zones and stream-side corridors important for the preservation of water quality, many species of rare plants, anadromous and resident fish habitat, and crucial terrestrial wildlife habitat. These riparian zones provide travel lands for birds and mammals, escape and thermal cover for big game and areas of snags or dead and dying trees for cavity dwellers. They are the most productive of all wildlife habitats. Retention of mature trees insures preservation of the riparian integrity through the provisions of shade, temperature control, and the retention of multilayered canopies of both evergreen and deciduous species.

Past efforts to provide suitable habitat for species dependent on old growth and mid-aged stands or using them for optimum habitat have been through provisions for single species management or for small groups of species. An example is the provisions for northern spotted owl (Strix occidentalis caurina) habitat. This large owl breeds and feeds principally in old growth forests of the west coast from northern California to British Columbia. Forsman (1977) indicated that a mean of 1,200 (480 ha.) acres of habitat per pair, including a 300 (120 ha.) acre core area of old growth timber, is the minimum necessary for survival of this non-migratory species. Subsequent research using radiotelemetry indicates additional old growth habitat may be required to sustain a pair of these owls. Interagency efforts proposed a 400-pair minimum breeding population of this owl be retained principally on BLM and Forest Service lands in western Oregon. Spotted owl habitat requirements have generally been agreed upon by wildlife biologists. Obviously these scattered habitats also provide food and shelter for many other wildlife species with requirements similar to the spotted owl, including their prey base.

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With the decline in old growth forest lands, remaining stands are becoming isolated from other similar habitats. If the present trend continues, the remaining tracts of older forests will generally be of small size, not sufficient to encompass the territorial requirements of attendant wildlife.

The two seral stages, mid-age (100-200) and old growth (200+), and riparian habitat are projected to be severely reduced in future years due to intensive forest management strategies (i.e., old growth liquidation). Remnant tracts of these seral stages are becoming isolated from other similar habitat. If the present trend continues, the remaining tracts of older forests will generally be of small size not sufficient to encompass the territory requirements of attendant wildlife. This fragmentation or isolation of the older seral stages will result in relic, non-viable populations of native wildlife disjuncted by large distances.

Table 1

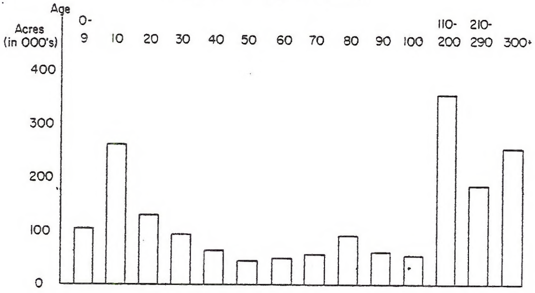
### Older Seral Stages of Coniferous Forest

Coniferous forests can be stratified into various seral stages that reflect total vegetative structure as illustrated for western Oregon in the table below:

| Seral Stage | Approx. Age | Some Key Characteristics |
|---|---|---|
| 1-Grass/Forb | 0-10 | Vegetation dominated by grasses and forbs |
| 2-Shrub/Seeding | 10-20 | Vegetation dominated by shrubs and seedlings |
| 3-Sapling/Pole | 20-80 | Closed canopy of sapling to pole-sized trees |
| 4-Young Mature | 80-120 | Trees still vigorous with pointed tops |
| 5-Mid-age | 120-200 | Rounded tree tops, increased decadence in live trees |
| 6-Old Growth | 200-400 | Flattened and broken tree tops, many snags and large down logs |

Figure 1

BLM Forest Acreages by Age Class in Western Oregon (1980)



## II. Impacts on Wildlife

The predicted impacts caused by the loss of older forest seral stages include local and regional extinctions and reductions of population levels of endemic wildlife. This will be most noticeable in avifaunal composition and numbers. The first group of birds impacted are the resident forest interior species.

Certain species of wildlife are adapted to climax or older plant communities and have specific habitat requirements. Examples: the pileated woodpecker nests only in extensive old growth forest in snags of specific size. At 100 years the forest is only beginning to provide the size tree used by this woodpecker and many more years are required to develop the decadent characteristics suitable for its food and reproductive requirements.

In western Oregon, about 30 secondary hole-nesting birds are dependent on 14 primary excavators. Other species, such as the pine marten, are sensitive to human disturbance and require large areas of secluded habitat. The marten's territory encompasses one to two square miles of contiguous older coniferous forest habitat.

Of the 462 species of wildlife (mammals, birds, amphibians, and reptiles) found in western Oregon, over 300 are associated with forested habitats.

Today there is emphasis on the northern spotted owl as a species that may be dependent on the entire structural condition termed "old-growth." But other "old-growth structural components," such as large snags and logs, are presently taken for granted. If some of the species associated with large snags and logs are, in fact, dependent on them, then old-growth stands will become increasingly important not only as the amount of old-growth declines but also as the large snags and logs disappear from the rest of the landscape because there is no plan to replace them.

In the last analysis, wildlife is but one product of a forest, and, because its existence is determined by plant community structure (or stand condition), it has become the hub, the pivot, of the "old-growth issue." The crux of the "old-growth issue," however, is not wildlife, but rather the maintenance of unmanipulated, "natural" forest gene pools within the manipulated (intensively managed) forest on BLM lands. In this sense, wildlife genetic diversity is but one aspect of forest genetic diversity -- both equate to ecosystem stability and productivity.

## III. Management Proposal

### A. Objective

The proposed objective is management of the older coniferous forest components of the forest ecosystem to maintain habitat diversity and integrity.

Habitat diversity requires attention to all seral stages and species unique habitats. Riparian habitat and older seral stages of the coniferous forest are currently of primary concern.

Numerous mandates (see authority) require management consideration of a variety of non-timber values In view of these, and recognizing the fact that additional needs will continually be identified, it is proposed to institute an ecosystem approach to management on BLM lands for maximum wildlife species richness and habitat diversity.

The principle of habitat diversity means that usually timber harvest can eventually be planned on all commercial forest land and that few, if any, formal "withdrawals" will have to be made for the preservation of any wildlife or plant species. The proposal makes maximum use of existing lands classified for restricted uses and withdrawals; such as riparian habitat, wild river classified areas, research natural areas, fragile land sites, etc. to help meet wildlife habitat management objectives.

### B. Authority

Management directions to insure species and habitat diversity on the public lands are well documented for the Federal agencies, the Department of Interior, and the Bureau. Specific regional management direction is also provided for Oregon and Washington.

1. All Federal Agencies:
    - a. National Environmental Policy Act (PL 91-190)
    - b. Endangered Species Act of 1973 (PL 93-205), as amended.
    - c. President's Executive Order 11990 (Wetlands)
    - d. Migratory Bird Treaty Act of 1918, USC 703-711
    - e. Fish and Wildlife Conservation Act of 1980 (PL 96-366)
2. Department of Interior
    - a. Department Regulation, Cooperation on Wildlife (43 CFR) Part 24 - Preservation, use and management of fish and wildlife resources and their habitats.
    - b. Sikes Act (PL 93-452), Cooperation with State Agencies and protection of state classified threatened species.

3. Bureau of Land Management

   a. Federal Land Management Policy Act (PL 94-579), Manage for multiple use and sustained yield.

   b. BLM Manual 1602 Environmental Protection and Enhancement - Ecosystems

   c. BLM Manual 1603 - Wildlife Program Activity Policy Statement - Maximum diversity of wildlife

   d. BLM Manual 6500 - Wildlife Management
   Major objectives include stabilizing declining habitats, providing endangered species protection, and consideration for all wildlife.

   e. BLM Manual 6602 - Integrated Habitat Inventory and Classification System -
   .02 Objectives - Use Ecosystem Management in the planning and decision making process of the Bureau.

   f. BLM Manual 6740 Typifies wetland riparian areas as "critical sources of biological diversity."

   g. BLM Manual 6840 - The objective is to conserve animals which are officially listed by Federal and/or state governments as being in potential danger of extinction, as well as those requiring special attention (sensitive species) in land management programs.

4. Specifically for Oregon

The Oregon State Office staff and District biologists developed a habitat management or ecosystem concept for wildlife in place of the single species management systems as per the Northern Spotted Owl Management Plan.

These efforts resulted in Instruction Memorandum No. OR-79-350, on May 23, 1979. This memorandum directed western Oregon District Managers to formulate and analyze presented alternatives varying from a full ecosystem concept for wildlife to a full timber protection concept that minimized wildlife requirements.

## C. Rationale for Diversity

Optimum wildlife habitat diversity would require 25 to 40% of the forest be maintained in older successional stages. However, District and State Office Biologists feel that if a minimum of 15% of BLM lands were retained in mid-age and old-growth forests, minimum habitat diversity requirements could be met. Approximately 2/3 of these lands should be in 80-acre blocks and 1/3 in large 640-acre tracts.

Besides providing habitat diversity, this system would meet the spotted owl requirements, the minimum requirements for old-growth and mid-age habitat and the minimum habitat requirements to maintain a 60% population level of cavity-excavating species. Recent information indicates a need for extended spotted owl habitat.

Thomas, 1979, using "a life forms concept," showed the greatest number of forest wildlife species were oriented towards the mature and old growth successional stages. To illustrate the need for retention of old growth, we can use two basic wildlife examples: one is spotted owl habitat, another is habitat for cavity-dwelling wildlife species.

Spotted owl requirements for old growth were originally defined in Instruction Memorandum OR-78-74 which specifies 1,200 acres per pair of which 300 acres of the core area must be old growth (200 years plus). If BLM maintains only its 90 pairs of birds, this equals a requirement of 27,000 acres of primary habitat, or about one percent of western Oregon BLM lands. To supply habitat requirements for 90 pairs of spotted owls with an additional 30% habitat retained to allow choice of pairs throughout planning, plus an equal number of acres of mid-age habitat to replace chosen decadent stands, habitat requirements for spotted owls would equal about 10% of currently remaining 100 year+ forest age classes. However, this habitat will not provide for an equitable distribution of habitat for the other wildlife species dependent on old growth.

Recent research on the spotted owl, using radio telemetry, now indicates that the paired birds utilize a minimum of 1000 acres of old growth forest habitat within their home range. This would equal about 4.5% of western Oregon BLM timberlands. These recent data are being evaluated.

Cavity dwelling wildlife requirements indicate that an average of two snags or cull trees per acre should be left to meet the 60% minimum population level. This average of 1280 snags or cull trees per section would meet the habitat demands of pileated woodpeckers as well as smaller primary excavators.

## D. Management Plan

The proposal is to structure the forest management program to provide naturally self-sustaining populations of all native wildlife species. This would be accomplished through vegetative diversification so that all seral stages are adequately represented over time.

This proposal would counter the current decline of older seral stages by allotting or planning for at least 15% of all forest lands to remain in the mid-age and old growth seral stages in perpetuity.

These managed tracts are to be maintained in two categories: large blocks (640 acres) for secretive and far ranging species, and small tracts (averaging 80 acres) to provide for maximum wildlife species diversity and habitat continuity on lands managed by BLM in western Oregon.

### 1. Size of Management Blocks

Selection of management block size is predicated on the habitat requirements to maintain maximum diversity of wildlife species.
Passerine birds are the most easily measurable index of species diversity. Whitcomb, (1977) states that population levels of less than 1,000 are considered very vulnerable genetically. MacClintock, et al. (1977) gives birds nesting densities. Several of the least abundant species nest at a density of about one nest per 80 acres. Five hundred and fifty nesting pairs (1,100 birds-with a 10% safety margin) X 80 acres = 44,000 acres. A BLM district 300,000 acres in size under the 15% plan would have about 45,000 acres in old growth or mid-age forests. This could support about 550 nesting pairs of forest interior species, a genetically safe population, if other requirements were met.

Thomas, Maser, Rodiek (1978) in their chapter on Edges in "Wildlife Habitats in Managed Forests, the Blue Mountains of Oregon and Washington," state that the zone of maximum wildlife species' richness occurs at a level of 74 to 99 acres (or about 80 acres). Other authors suggest about 100 acres. Galli (1976) suggests that 80 acres is the appropriate block size to maximize species' richness.

McClelland (1977) states that "a minimum of about 100 acres of contiguous old growth are considered necessary for suitable long-term nesting habitat for a pair of pileated woodpeckers in the Western Larch/Douglas-fir cover type."

It was determined that a need for larger blocks of land (640 acres) are needed to insure habitat preservation and freedom from harassment for wilderness species such as the fisher, marten, and cougar, to provide spotted owl habitat and thermal and survival cover for elk and deer.

The need for big game thermal cover is based on survival during periodic severe winter storms such as occurred in 1948-49 and 1968-69. These storms caused heavy losses of deer and elk throughout Oregon. Reports indicate that big game, especially elk, invariably sought out old growth forest stands when available where the dense overstory provided thermal cover and decreased snow fall to the ground. Ground forage is more available since snow depth is much less than outside of the canopy. James Harper, Oregon Department of Fish and Wildlife biologist, in a letter to the Coos Bay District Office, September 28, 1979, states that "the objective of thermal cover is to provide a forest stand structure which will intercept snow during severe storms and provide sufficient quantities of forage in the same stand. The structure of a timber stand, not its age, is what is importnat to big game animals although age may be an indication of stand structure characteristics."
He also states that "Historically, elk have preferred the oldest available cover, particularly during severe weather." Harper goes on to stress the use of litter fall (lichens and branches) as a source of nutritious forage after a severe storm. He says that the structure of old growth and mid-age forest stands provides thermal cover, but that stand structure can vary by site, aspect, density and other factors.

A Department of Fish and Wildlife brief on "Life History of Roosevelt Elk in Oregon," 1974, in a section on Specific Habitat Requirements, Winter, states that "A definite requirement for old growth timber during times of heavy snow cover (exists). Snow depths are much less under timber and fallen branches, leaves and lichens provide food which is not available on cutover areas during snow cover periods." Witmer's (1980) study shows a definite preference of Roosevelt elk in the Coos Bay district for old growth cover types.

Summer thermal cover is also best satisfied by mid-aged and old growth stands. Unpublished studies by Dick King, former Coos Bay biologist, showed heavy elk preference of the oldest stands available for summer thermal protection. Temperature differentials of 20% or more were indicated under the canopy as compared to adjacent clear cuts or younger forest stands.

While it appears that elk will utilize areas without mid-aged or old growth timber (such as the Tillamook Burn), they do much better during severe weather in areas of older forest stands (Harper, 1969). Recent studies, such as that by Wallmo and Schoen, (1980) in "Response of Deer to Secondary Forest Succession in S.E. Alaska" indicate a blacktailed deer preference of mature timber habitat. "Over-mature stands served a more diverse and abundant understory than did second growth stands ranging from 30 to 147 years."

### 2. Age and Structure

A variety of seral stages is required to produce nesting and feeding habitat, and thermal cover for many wildlife species.

Mannan, 1977, found that hole nesting birds in western Oregon utilize forests over 70 years of age. In these forests, Douglas-fir snags which were utilized averaged 24" DBH and were over 49' tall. He states that "timber harvest rotations of 70 years or less would reduce the overall bird species diversity - in the Douglas-fir - region by reducing or eliminating the older forests utilized by certain tree and many hole-nesting birds."

McClelland, 1977, recommends identification of old growth blocks to be managed on a minimum rotation age of 300-400 years to support viable populations of hole nesters.

It is the large snags which are found in 100-200 year old forests that produce the relatively high density of hole-nesting birds (Cline, 1977).

### 3. Distribution

Scattering tracts approximately one (1) mile apart will prevent the regional extinction and/or drastic population declines that occur when forest systems (habitat types covering the full range of seral stages) of adequate size and continuity are not maintained throughout an ecosystem.

These dispersed tracts will provide the habitat continuity required to maintain viable populations of wildlife endemic to western Oregon forests. Seral stages representing the habitat requirements of indicator species such as pileated woodpeckers must be distributed over time and space to allow interchange between individuals and thus prevent genetic isolation. The distribution of habitats provide travel or migration corridors to allow dispersal of progeny or emigration of new individuals.

Many other benefits are associated with the maintenance of scattered tracts such as: protection of T/E species, providing escape cover for big game, including thermal and survival cover. Distribution of these tracts may also minimize disturbance to wildlife.

McClelland, 1977, considers the pileated woodpecker as an indicator of ecosystem integrity. He concludes the pileated woodpecker appears to be the most sensitive species in relation to nesting habitat disturbance.

### 4. Corridors

A system of "corridors" could be used as an alternative to a regionwide habitat diversity management strategy. This tool could be used to guide the scheduling of forest management operations with the objective of maintaining representative blocks of the older forest seral stages over time and space. These corridors offer one way of achieving a desirable distributional pattern of the older forest seral stage throughout western Oregon.

Corridors are based on broad island biogeographic principles. These principles have been recognized in the literature by many researchers (Diamond, 1975; Galli et al., 1976; MacArthur and Weldon, 1967; Robbins, 1979; Whitcomb, 1977; Lynch and Whitcomb, 1977; MacClintock et al., 1977; Lang, 1980, and others).

The basic idea behind establishing corridors is to allow resident and migratory species mobility in an environment which consists of fragmented islands of habitat.

In this land management proposal, corridors are defined as A 2 to 5 mile wide management zone which links older aged forest blocks that are at least 640 acres in size. These corridors are composed of dispersal blocks which are from 6 to 100 acres (recommended average of 80 acres) in size and redistributed throughout the corridor at a frequency of approximately one per lineal mile.

Several researchers (Anderson, 1981; Robbins, 1979; MacClintock et al., 1977 and Diamond, 1975) have recommended the use of corridors to connect larger blocks of habitat to smaller ones to prevent or minimize isolation of habitat. Lang, (1980) suggests that extinction of species which inhabit mature and old growth forests could be minimized by preventing the total isolation of habitat patches.

In western Oregon, the corridors would be designed using the existing large and small blocks of mature and older forests. These blocks of habit would be of the same size as discussed above under Size of Management Blocks. In reality, the size, shape and location of the "blocks" would be determined by many of the ground factors, such as owership pattern, topography, weather, etc. Management of habitat blocks pertains to BLM lands only.

An important on the ground feature would be riparian management areas. These generally incorporate streamside buffers, and can be important migration corridors if managed to meet wildlife habitat requirements. However, these corridors or migration routes along main stem and tributary streams only supplement the blocked corridor system because they are generally narrow by design. These riparian management areas would provide greater wildlife values if managed permanently as older forest.

Evans and Conner, (1979) recommend retaining an uncut area of 20 times the stream width (not to exceed 50 M) on both sides of water courses. These buffers provide stream-related protection and also would act as corridors for all forms of wildife.

BLM policies and guidance for protection of streams and Riparian Management Areas (RMS's) are contained in various manuals and directives (Manuals 6512, 5421, 6511, 6740, 6760, and Inst. Memo OR-80-243).

A landform feature that provides an additional dimension to diversity of habitat is elevation. Picton, (1979) states that "habitat diversity showed a relationship to area and particularly to topographic relief." He further states that these landform features were important factors in preventing loss of species.

A corridor system established in western Oregon could conceivably encompass a topographic relief ranging from sea level to 6,000 feet.

Today (1981) there is still enough old growth forest remaining on the public lands with the structural features and spacing to establish a system of corridors of unmanaged forest land. But once the old-growth is gone, the option to provide this habitat is foreclosed for at least 200-300 years.

Habitat Diversity Benefits Include:

1. Habitat for threatened and endangered flora and fauna - reduction in the need for listing additional species as threatened/endangered.

2. No lands are totally withdrawn from other uses.

3. All seral stages are maintained in sufficient size and distribution to provide for attendant plants and animals.

4. This plan will provide for future snags by maintaining the later seral stages - 120+ years.

5. Maintenance of the crucial habitat components of a variety of species, i.e., elk calving and survival cover, spotted owl habitat, large trees and snags for bald eagle nesting, and hold nesting birds.

6. Meet the habitat requirements of the northern goshawk and other species that use older forest successional stages as optimum habitat.

7. Protection of riparian and key aquatic habitats.

8. Maintenance of old growth forest tracts would provide a seed source maintenance of natural gene pools of the major forest tree species.

9. Establishment of old growth blocks with connector corridors to provide stability to wildlife populations and the total forest ecosystem.

10. Provides for habitat levels required to sustain viable population of dependent wildlife.

11. Implementation of the habitat diversity or ecosystem theory will reduce the need for single species management.

## 5. Riparian Habitat

Riparian habitats are a minor proportion of the total forest land base. However, not withstanding their size, these habitats are the most productive of all wildlife habitats. The proposal is to manage riparian habitat to the benefit of wildlife.

The productivity of riparian habitat is influenced by several factors. They are well defined and subsequently provide important edges through their entire length as they bisect other habitats. This edge effect provides maximum habitat needs within the home range of many wildlife species as a result of multi-stratifications of vegetation over given distances. One of the most outstanding features of riparian habitat is their role as travel lanes, migration routes or connector corridors between other habitats.

### Riparian Benefits Include:

1. Some 261 wildlife species in western Oregon utilize riparian habitat to some degree. Of this number over 50 species use riparian zones as optimum habitat.

2. Ninety (90) percent of the threatened and endangered plants known to occur in western Oregon are found in riparian areas.

3. Stream buffers and/or riparian zones provide travel lanes and migration corridors which, in turn, serve to minimize isolation of habitats.

4. Some species such as the great blue heron are site-specific to riparian habitat for reproduction and feeding.

5. Provides an area where all snag management objectives can be realized over an extensive area with minimal conflict with forest management.

6. Complements the streamside buffer zone by providing stability and a cushion against blowdown.

7. Maintenance of water quality and fisheries habitat.

## Summary

Providing for wildlife habitat through the concept of habitat diversity will insure a retention of all forest seral stages in the amount necessary to meet wildlife habitat requirements. These seral stages must include the mid-age and old growth forests that supply the breeding, feeding, and cover requirements necessary for the many species of wildlife dependent on this type of cover, or using it for optimal habitat.

Alternatives could range from full habitat diversity with 25 to 40% of the forests to be maintained in well distributed older seral stages to a less effective partial distribution, or confined to corridor areas. Biologists believe, however, that at least 15% of all forest lands must remain in mid-age and old growth seral stages to meet minimum habitat diversity requirements.

Gosz, (1981) summarizes the situation as follows: "the best management procedure for achieving a policy of maintaining wildlife diversity is that of maintaining habitat diversity (i.e., maintaining the variety of communities and seral stages common to the area). Although we may not understand all of the interrelationships that go on, it is the only management concept which has a chance of maintaining plant and animal diversity. If it is desirable to maintain populations of plants and animals dependent on old-growth habitat, there is no choice but to maintain the old-growth habitat.

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Species which obtain their major life requirements in the older coniferous forests (midage/old growth) seral stages - western Oregon.

(*) = species using old growth forests as optimum habitat.

Reference #

Birds

| Reference # | | |
|---|---|---|
| 8b | great blue heron | *Ardea herodias* |
| 7 | bufflehead | *Bucephala albeola* (c) |
| 1, 2, 3, 7 | *Northern goshawk | *Accipiter gentilis* |
| 8a, 8b | red-tailed hawk | *Buteo jamaicensis* |
| 7 | golden eagle | *Aquila chrysaetos* |
| 7 | *bald eagle | *Haliaeetus leucocephalus* |
| 7 | osprey | *Pandion haliaetus* |
| 8d | blue grouse | *Dendragopus obscurus* |
| 8a | band-tailed pigeon | *Columbia fasciata* |
| 4, 7 | common screech owl | *Otus asio* (c) |
| 8b, 8d | great horned owl | *Bubo virginianus* (c) |
| 8 | pygmy owl | *Glaucidium gnoma* (c) |
| 1, 8 | *northern spotted owl | *Strix occidentalis caurina* (c) |
| 8d | saw-whet owl | *Aegolius acadicus* (c) |
| 1, 9 | *Vaux's swift | *Chaetura vauxi* (c) |
| 1, 3, 4 | *pileated woodpecker | *Dryocopus pileatus* (c) |
| 8b, 8d | yellow bellied sapsucker | *Syphrapicus varius* (c) |
| 8b | hairy woodpecker | *Picodes villosus* (c) |
| 1, 3, 7, 8a | *Hammond's flycatcher | *Empidonax hammondi* |
| 8b | western flycatcher | *Contopus sordidulus* (c) |
| 8a | tree swallow | *Iridoprocne bicolor* (c) |
| 8b | purple martin | *Progne subis* (c) |
| 4, 8d | gray jay | *Perisoreus canadensis* |
| 8 | northern raven | *Corvus corax* |
| 8d, 8a | chestnut-backed chickadee | *Parus rufescens* (c) |
| 8 | red-breasted nuthatch | *Sitta canadensis* (c) |
| 3, 7 | *brown creeper | *Certhia familiaris* (c) |
| 8b | winter wren | *Troglodytes Troglodytes* |
| 8 | varied thrush | *Ixoreus naevius* |
| 8 | hermit thrush | *Catharus guttata* |
| 4, 8a | golden-crowned kinglet | *Regulus satrapa* |
| 4, 8a | ruby-crowned kinglet | *Regulus calendula* |
| 1 | *Townsend's warbler | *Dendroica townsendi* |
| 3 | *hermit warbler | *Dendroica occidentalis* |
| 8b | western tanager | *Piranga ludoviciana* |
| 8a, 8b | evening grosbeak | *Hesperiphona vespertina* |
| 8a, 8b | pine siskin | *Carduelis pinus* |
| 7 | *red crossbill | *Loxia curvirostra* |

Mammals

| | | |
|---|---|---|
| 8 | shrew-mole | *Neurochrichus gibbsi* |

| | | |
|---|---|---|
| 1 | *coast mole | *Scapanus orarius* |
| | little brown myotis | *Myotis lucifugus* (c) |
| 2, 7 | yuma myotis | *Myotis yumanenis* (c) |
| | California myotis | *Myotis californicus* (c) |
| 1, 7 | *long-legged myotis | *Myotis olans* (c) |
| 1, 3, 7 | *long-eared myotis | *Myotis evotis* (c) |
| 7 | big brown bat | *Eptesicus fuscus* (c) |
| 1 | *hoary bat | *Lasiurus cinereus* (c) |
| 1, 3, 7 | *silver-haired bat | *Lasionycteris noctivagan* |
| 1, 3, 7 | *northern flying squirrel | *Glaucomys sabrinus* (c) |
| | chickaree | *Tamiasciurus douglasi* |
| 3, 4 | *bushy-tailed woodrat | *Neotoma cinerea* (c) |
| 1, 3 | *red tree vole | *Arborimus longicaudus* |
| 1 | *California red-back vole | *Clethrionomys californic* |
| | cougar | *Felis concolor* |
| 8b | bobcat | *Felis rufus* |
| 8b | black bear | *Ursus americanus* |
| 1, 7 | *marten | *Martes americana* (c) |
| 7 | *fisher | *Martes pennanti* |
| 8b | spotted skunk | *Spilogale putorius* (c) |
| 8 | short-tailed weasel | *Mustela erminea* |
| 8, 12 | Roosevelt elk | *Cervus elaphus roosevelti* (sc) |
| 8 | black-tailed deer | *Odocoileus hemionus columbianus* (sc) |
| | Siskiyou Mountain salamander | *Plethodon stormi* |
| 8b | clouded salamander | *Aneides ferreus* |
| | Oregon salamander | *Ensatina eschscholtzi* |

* Species using old growth coniferous forest as optimum habitat.

sc Species which use midage and old growth forest during periods extreme winter conditions as survival cover.

s Cavity dwellers.

# SPECIES WHICH UTILIZE RIPARIAN AS OPTIMUM HABITAT 1/

## Birds

| | | |
|---|---|---|
| 2, 4 | great blue heron | Ardea herodias |
| 2 | green heron | Butorides striatus |
| | black-crowned night heron | Nycticorax nycticorax |
| | mallard | Anas platyrhynchos |
| | harlequin duck | Histrionicus histrionicus |
| | wood duck | Aix sponsa |
| | hooded merganser | Lophodytes cucullatus |
| | common merganser | Mergus merganser |
| | red-breasted merganser | Mergus serrator |
| | bald eagle | Haliaeetus leucocephalus |
| | osprey | Pandion haliaetus |
| | ruffed grouse | Bonasa unbellus |
| | spotted sandpiper | Actitus macularia |
| | solitary sandpiper | Tringa solitaria |
| | saw-whet owl | Aegolius acadicus (c) |
| 4 | common screech owl | Otus asio |
| 4 | belted kingfisher | Megaceryle alcyon |
| | downy woodpecker | Picodes pubescens |
| | willow flycatcher | Empidonax traillii |
| | western flycatcher | Empidonax difficilis |
| | barn swallow | Hirundo rustica |
| 8a | purple martin | Progne subis |
| | black-capped chickadee | Parus atricapillus |
| 4 | dipper | Cinclus mexicanus |
| | winter wren | Troglodytes troglodytes |
| | black-headed grosbeak | Pheucticus melanocephale |
| | yellow-bellied sapsucker | Syphrapicus varius |
| 8b | cedar waxwing | Bombycilla cedrorum |
| | Swainson's thrush | Catharus ustulata |
| | warbling vireo | Vireo gilvus |
| | red-eye vireo | Vireo olivaceus |
| | solitary vireo | Vireo solitarius |
| 8b | yellow warbler | Dendroica petechia |
| | common yellowthroat | Ceothlypis trichas |
| | yellow-breasted chat | Icteria virens |
| 8b | Wilson's warbler | Wilsonia pusilla |
| 8d | yellow-headed blackbird | Xanthocephalus xanthocephalus |
| 8d | red-winged blackbird | Agelaius phoeniceus |
| 8d | northern oriole | Icterus galbula |
| | Lincoln's sparrow | Melospiza lincolnii |

## Reptiles and Amphibians

| | | |
|---|---|---|
| | western pond turtle | Clemmys marmorata |
| 4 | common garter snake | Thamnophis sirtalis |
| 4 | western aquatic garter snake | Thamnophis couchi |

| | | |
|---|---|---|
| | western terrestrial garter snake | *Thamnophis elegans* |
| | northwestern salamander | *Ambystoma gracile* |
| 8a | pacific giant salamander | *Dicamptodon ensatus* |
| 2, 4 | Olympic salamander | *Rhyacotriton olympicus* |
| | rough-skinned newt | *Taricha granulosa* |
| 8d | Dunn salamander | *Plethodon dunni* |
| 8d | Oregon salamander | *Ensatina eschscholtzi* |
| 8a, 8d | western red-backed salamander | *Plethodon vehiculum* |
| 8a, 8d | Oregon slender salamander | *Batrachoseps wrighti* |
| 8d | long-toed salamander | *Ambystoma macrodactylum* |
| 9d | clouded salamander | *Aneides ferreus* |
| 4 | tailed frog | *Ascaphus truei* |
| | western toad | *Bufo boreas* |
| 4 | Pacific treefrog | *Hyla regilla* |
| 4 | red-legged frog | *Rana aurora* |
| 8a | Foothill yellow-legged frog | *Rana boylii* |
| | Cascade frog | *Rana cascadeae* |
| | bull frog | *Rana catesbeiana* |
| | spotted frog | *Rana pretiosa* |

**Mammals**

| | | |
|---|---|---|
| | opossum | *Didelphis virginiana* |
| | Yuma myotis | *Myotis yumanenis* |
| | beaver | *Castor canadensis* |
| | nutria | *Myocastor coypus* |
| | muskrat | *Ondatra zibethicus* |
| | Pacific jumping mouse | *Zapus trinotatus* |
| | raccoon | *Procyon lotor* |
| | mink | *Mustela vison* |
| | river otter | *Lutra canadensis* |
| | white-footed vole | *Arborimus albipes* |
| | Townsend vole | *Microtus townsendi* |
| 4 | long-tailed vole | *Microtus longicaudus* |
| | Richardson vole (water vole) | *Microtus richardsoni* |
| 2 | Pacific shrew | *Sorex pacificus* |
| 4 | marsh shrew | *Sorex bendirei* |
| | Northern Water Shrew | *Sorex palustris* |
| | Trowbridge shrew | *Sorex trowbridgei* |
| | Yaquina shrew | *Sorex yaquinae* |

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